

# 2-Phases Multichannel Image Segmentation

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## Resumen

Digital image segmentation refers to a key process in many image processing protocols which aims to extract a phase partition of the given data set. The target, or object can be defined using information provided from different data sources or imaging modalities so providing a multi-channel structure which is dealt with in a vectorial formulation. The resulting model can be defined in a variational framework by using an appropriate energy functional.

In this work we extend recent results we obtained in the scalar multiphase case [1]. Our proposal is based on the dual formulation of the Vectorial Total Variation (VTV) operator [2] originally introduced as a fast and well-posed regularization algorithm for color image processing and image completion. To produce a fast segmentation algorithm for multi-channel structures in the 2-phases (classification) problem using the VTV norm we consider a new weighted Mumford-Shah type functional which is minimized by a genetic algorithm. New theoretical and numerical issues with respect to the scalar case will arise.

Some applications of our technique to real 3D data sets for medical image segmentation shall be discussed.

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## Referencias

- [1] J. F. Garamendi, N. Malpica, E. Schiavi. *Multiphase Systems for Medical Images Classification*. American Institute of Physics. AIP Conf. Proc. / Volume 1124 / Issue 1, pp. 158-165. DOI:10.1063/1.3142929. 2009.
- [2] X. Bresson and T. Chan *Fast dual minimization of the vectorial total variation norm and applications to color image processing*. Inverse Problems and Imaging Volume: 2, Number: 4, pp 455 - 484, 2008.